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OMEGA®

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ENGINEERING, INC.

An OMEGA Group Company

OMEGA®

OMEGA-CJ

Thermocouple Cold-Junction Compensator

Operator's Manual

OMEGA®

WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of one (1) year from date of purchase. If the unit should malfunction, it must be returned to the factory for evaluation. Our Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. However, this WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive current, heat, moisture, vibration, or misuse. Components which wear or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

THERE ARE NO WARRANTIES EXCEPT AS STATED HEREIN. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL OMEGA ENGINEERING, INC. BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES. THE BUYER'S SOLE REMEDY FOR ANY BREACH OF THIS AGREEMENT BY OMEGA ENGINEERING, INC. OR ANY BREACH OF ANY WARRANTY BY OMEGA ENGINEERING, INC. SHALL NOT EXCEED THE PURCHASE PRICE PAID BY THE PURCHASER TO OMEGA ENGINEERING, INC. FOR THE UNIT OR UNITS OR EQUIPMENT DIRECTLY AFFECTED BY SUCH BREACH.

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Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to OMEGA Customer Service Department, telephone number (203) 359-1660. Before returning any instrument, please contact the OMEGA Customer Service Department to obtain an authorized return (AR) number. The designated AR number should then be marked on the outside of the return package.

To avoid processing delays, also please be sure to include:

1. Returnee's name, address, and phone number.
2. Model and Serial numbers.
3. Repair instructions.

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TABLE OF CONTENTS

OMEGA-CJ THERMOCOUPLE COLD JUNCTION COMPENSATOR

SECTION		PAGE
SECTION 1	**INTRODUCTION**	**1**
1.1	General Description	1
1.2	Features	1
SECTION 2	**UNPACKING**	**2**
SECTION 3	**OPERATION**	**2**
3.1	Operating Procedure	2
3.2	Battery Replacement	4
3.2.1	Battery Life	4
3.2.2	Replacing the Battery	4
SECTION 4	**THEORY OF OPERATION**	**5**
SECTION 5	**SPECIFICATIONS**	**7**

SECTION 1 INTRODUCTION

1.1 GENERAL DESCRIPTION

The OMEGA®-CJ is a portable battery-powered automatic cold junction compensator for use in thermocouple circuits. It provides the physical and electrical equivalents of an ice bath reference thermocouple at 0°C or 32°F.

Thermocouples can be plugged directly into the OMEGA-CJ. A quick disconnect male plug and output jack with banana plugs are provided for connecting the CJ to potentiometers as well as to meters and recorders of high input impedance.

1.2 FEATURES

- High reliability—solid state circuitry with self contained battery
- Rugged construction
- Color coded thermocouple calibration
- Instantaneous warm-up
- High Stability—better than ±0.2°C at any stabilized temperature over its full +10° to 50°C range
- Extreme versatility—unit can be plugged directly into a thermocouple or into a jack panel
- Long battery life—1500 hours or longer depending on calibration

SECTION 2 UNPACKING

Remove the Packing List and verify that all equipment has been received. If there are any questions about the shipment, please call OMEGA Customer Service Department at (203) 359-1660.

Upon receipt of shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

SECTION 3 OPERATION

3.1 OPERATING PROCEDURE

The OMEGA-CJ comes complete with quick-disconnect male plug and output jack with banana plugs for connecting to potentiometers, meters and recorders of high impedance. Thermocouples can be plugged directly into the OMEGA-CJ.

Operation is instant; the OMEGA-CJ's solid-state design requires no warm-up.

1. Connect output to OMEGA-CJ (TO INSTRUMENT) to readout instrument. Copper wire extension leads must be used.
2. Connect thermocouple to other end of OMEGA-CJ (TO THERMOCOUPLE). If thermocouple probe is not directly coupled to OMEGA-CJ, it is necessary to use thermocouple extension wires from the thermocouple to the OMEGA-CJ.
3. Move ON-OFF slide switch to ON to energize unit.
4. The readout instrument will now indicate the actual temperature, unaffected by ambient temperature changes.

NOTES

OMEGA-CJ has an internal resistance of up to 250 ohms, depending on calibration; therefore. readout instruments of high input resistance (impedance) must be used to minimize errors.

Following use, always move ON-OFF slide switch to OFF to conserve the battery.

3.2 BATTERY REPLACEMENT

3.2.1 Battery Life

The self-contained battery is a mercury cell—1.35 V Mallory RM401R, or equivalent. Design life in continuous operation is as follows:

Calibration	Approximate Life (hours)
Chromel-Alumel	3000
Iron-Constantan	1500
Copper-Constantan	3800
Chromel-Constantan	1800
Pt/10% Rh-Pt	7800
Pt/13% Rh-Pt	7800
W-W/26% Re	5000
W/5% Re-W/26% Re	5000
W/3% Re-W/25% Re	5000

3.2.2 Replacing the Battery

The indicator on the face of the OMEGA-CJ, energized by depressing the BAT TEST push button, indicates when battery replacement is necessary. The battery should be replaced when the indicator becomes dim.

To replace the battery, remove the cover plate by unscrewing the single flathead screw and snap out the battery. Follow correct polarity when installing the replacement battery.

NOTE

For extended shelf-life of the mercury battery, avoid storage at high temperatures.

SECTION 4 THEORY OF OPERATION

The OMEGA-CJ introduces an emf into the circuit which is equivalent to an ice bath. This emf is regulated by a temperature sensitive resistor (R_T) in an electrical bridge network (see Figure 4-1) which compensates for ambient temperature changes, always maintaining a 0°C or 32°F reference equivalent.

The temperature sensitive resistor (R_T) is thermally integrated with the cold junction (T_2), with the bridge being energized by a 1.35 V mercury battery.

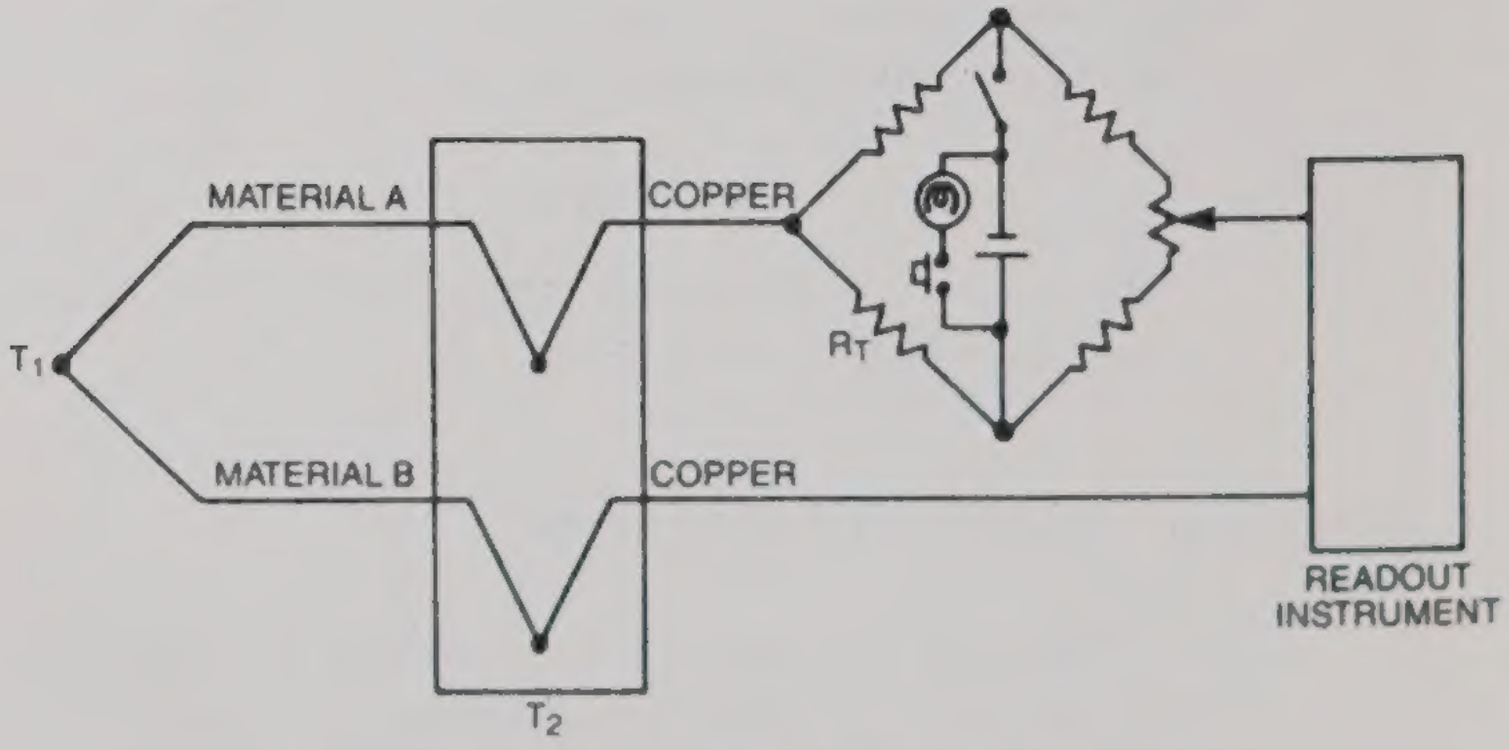

Figure 4-1. Wiring Diagram

As the ambient temperature surrounding the cold junction varies, a thermally generated voltage appears and produces an "error". However, an equal and opposite voltage produced by the bridge is automatically introduced in series with the "error" voltage, canceling the "error". This maintains the reference temperature over a wide ambient temperature range with a high degree of accuracy.

By integrating copper leads with the cold junction, the thermocouple material itself is not connected to the input terminals of the measurement instrument, thereby eliminating secondary errors.

SECTION 5 SPECIFICATIONS

REFERENCE TEMPERATURE SETTING:	0°C or 32°F
COMPENSATION ACCURACY:	± ¼ °C at 25°C ambient setting ± ½ °C from 15° to 35°C ambient ± ¾ °C from 10° to 50°C ambient
STORAGE TEMPERATURE:	−25° to +75°C (without battery)
INTERNAL RESISTANCE (IMPEDANCE):	Less than 250 ohms
CALIBRATIONS AVAILABLE:	Chromel-Alumel Iron-Constantan Copper-Constantan Chromel-Constantan Pt/10% Rh-PT Pt/13% Rh-Pt W-W/26% Re W/5% Re-W/26% Re W/3% Re-W/25% Re
BATTERY:	1.35 V Mallory mercury cell (RM401R)
DIMENSIONS:	H: 1¾" (44.45 mm) × L: 4³⁄₁₆" (106.36 mm) × W: ¾" (19.05 mm)
WEIGHT:	12 oz. (342.0 g)

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